

[From the PROCEEDINGS OF THE ROYAL SOCIETY, B, VOL. 88, 1914.]

The Cultivation of Human Tumour Tissue in Vitro.—Preliminary Note.

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The Cultivation of Human Tumour Tissue in Vitro.—Preliminary Note.

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(Communicated by Sir Ronald Ross, K.C.B., F.R.S. Received April 4,—Read May 14, 1914.)

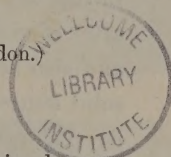
(From the Marcus Beck Laboratory, Royal Society of Medicine, London.)

[PLATE 7.]

On two occasions the authors have definitely succeeded in cultivating human tumour tissue *in vitro*. The tissue was obtained at operations performed by Sir John Bland-Sutton at the Middlesex Hospital, and conveyed in sterile Ringer's solution in a thermos flask to the laboratory, where small portions were immediately inoculated into the culture medium.

(a) *Intracystic Papilloma of the Ovary* (not truly malignant).—This tissue was grown in a medium composed of fowl plasma 1 part, Ringer's solution (containing 0·5 per cent. of glucose) 1 part, and extract of the tumour in Ringer's solution 1 part. On the third day of incubation at 37·5° C. definite buds of new growing tissue appeared. On the fifth day these were more distinct and on the eighth day the amount of growth had increased considerably (fig. 1, Plate 7). This growth consisted of a solid extension of epithelial cells. As the growth increased it caused some liquefaction of the medium, which was of a gelatinous consistence, and in the more liquefied parts the new growing cells were scattered (fig. 2), but as a rule they remained in contact with each other by means of long fine protoplasmic connections (fig. 3). The new actively proliferating cells varied markedly from the cells of the original tissue planted in the medium. The former were large and amœboid, with long processes which communicated with each other, and they also contained large highly refractile granules. The original cells, on the other hand, were much smaller; they showed no amœboid processes, did not exhibit amœboid movement and they contained few or no refractile granules. This tumour was a very soft one and appeared to contain little or no fibrous stroma. It was composed entirely of epithelial cells, and it will be noted that the new growth also consisted of epithelial cells only.

(b) *Carcinomatous Gland from the Neck* (secondary to carcinoma of the floor of the mouth).—Small portions of this tumour tissue grew most success-



fully in a medium composed of fowl plasma 1 part + extract of embryonic chick 1 part. Unlike the previous tumour, this one was somewhat tough and fibrous, due to the presence of a considerable amount of connective tissue stroma, and it is interesting to note that the new growth in this case consisted of both tissues.

After 44 hours' incubation at 37.5°C , long branching stroma cells appeared growing out from the original tissue. After five days, there appeared in several places solid buds composed of epithelial cells, and these increased in size day by day. Fig. 4 represents a microphotograph of the live tissue after nine days' incubation and shows clearly the outgrowth of stroma cells and also new buds of epithelial cells of the cancer. Fig. 5 shows definitely a solid outgrowth of cancerous epithelial cells after nine days' incubation, and fig. 6 shows the marked increase of the same portion after 13 days' incubation. Growth ceased after 15 days. As in the case of the papilloma of the ovary the new growing epithelial cells were again much larger than the original. They were amœboid and were filled with highly refractile granules. It is interesting to note that these human tumour tissues were cultivated in a medium composed chiefly of fowl blood plasma, or, in other words, the human tissue proliferated in a nutrient material obtained entirely from a bird. This is contrary to what was previously believed, since it was considered that the tissue of a certain animal could only grow in a medium composed of the blood plasma of the same species of animal.

Fuller details of this work, and parallel researches on the cultivation of the normal tissues of other animals, will be published in the Proceedings of the Royal Society of Medicine.

EXPLANATION OF PLATE.

(All the figures represent microphotographs of the live growing tissue.)

- Fig. 1.—Papilloma of ovary; tissue after eight days' incubation. Note the outgrowth of processes composed of epithelial cells. $\times 50$ diameters.
- Fig. 2.—Another portion of the same after nine days' incubation. The medium is becoming liquefied and the new cells are somewhat scattered. $\times 90$.
- Fig. 3.—Higher magnifications of the new growing cells. Note the amœboid protoplasmic processes and the highly refractile granules. $\times 870$.
- Fig. 4.—Cancerous lymphatic gland; tissue after nine days' incubation. Note the buds of epithelial cancer cells and also the outgrowth of connective tissue stroma cells. $\times 80$.
- Fig. 5.—Another portion of the same, after nine days' incubation. Note the solid outgrowth of epithelial cancer cells. $\times 80$.
- Fig. 6.—Same portion after thirteen days' incubation. Note the marked increase of the outgrowth of epithelial cancer cells. $\times 80$.

